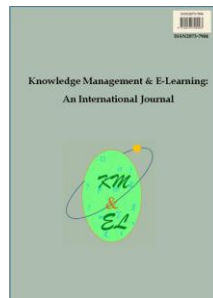




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Editorial: Smart cities of the future: Creating tomorrow's education toward effective skills and career development today

Fanny Klett (IEEE Fellow)

German Workforce ADL Partnership Laboratory, Germany

Minhong Wang

The University of Hong Kong, Hong Kong

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Editorial: Smart cities of the future: Creating tomorrow's education toward effective skills and career development today

Fanny Klett, IEEE Fellow*

Director, German Workforce ADL Partnership Laboratory, Germany
E-mail: fanny.klett.de@adlnet.gov

Minhong Wang

KM&EL Lab, Faculty of Education
The University of Hong Kong, Hong Kong
E-mail: magwang@hku.hk

*Corresponding author

Abstract: This special issue is dedicated to recent opportunities, perceptions, solutions and expectations that the emergent number of cities, exploiting the Smart City concept, face in designing and providing education that is striving to shape the new generation of the Smart Citizens. Smart Cities are improving the interconnection between citizens and with governments paying regard to shaping a new environment for the education of today's students for life in tomorrow's multifaceted technology-driven world. Various definitions that evolved from Digital City through Wireless City to Smart City and recently Smart City of the Future make us aware that technology and infrastructures are the leading aspect of the Smart City concept. The Smart City concept embraces not only various definitions but also diverse directions representing a collection that conveys many opportunities for educational arrangements. Viewed in this way, it builds the focus of this special issue illustrating the utilization of technologies, and methodology design experiences toward a Smart City setting by considering a wide-range of education and human performance development aspects, including new opportunities for learning and instruction, technology-enhanced learning, curriculum reform, assessment, skills development, and competence and knowledge management in a highly interconnected networked environment.

Keywords: Smart cities; Smart buildings; Urban development; Higher education; Value co-creation; Healthcare management; Assessment; Competence management; Knowledge management

Biographical notes: Dr. Fanny Klett assumed the Directorship of the German Workforce Advanced Distributed Learning Partnership Laboratory, which is run in cooperation with the US Government, in 2009. Prior to this position, she has been with leading research institutions in principal positions. Fanny Klett is regularly invited as Visiting Professor and Distinguished Lecturer at universities worldwide. Her research addresses advanced solutions in the areas of information, data and content management with regard to competency and job performance management, assessment, knowledge management, technology-enhanced learning, and interoperability. Dr. Klett actively works in standardization bodies, such as IEEE Learning Technology Standards Committee, US Advanced Distributed Learning Initiative, and is CEN WS-LT

LTSO expert. She chaired and served on more than 30 conference planning and program committees of UNESCO, IEEE, APSCE, etc. Fanny Klett is associated editor of IEEE publications and serves on the editorial board of several international journals on advanced technology themes including IEEE Transactions on Education, and IEEE Educational Technology and Society Journal. In addition, she assists various governmental research sponsoring organizations worldwide, as an expert. Dr. Klett is IEEE Fellow. She is Member of the Sponsor Executive Committee and Secretary of the IEEE Learning Technology Standards Committee, and Member of the Council and the Academic Board of the European Association for Education in Electrical and Information Engineering.

Dr. Maggie Minhong Wang is an Associate Professor in the Faculty of Education, The University of Hong Kong, and Director of the Knowledge Management & E-Learning (KM&EL) Lab. She has been involved in multiple disciplinary research in the areas of technology-enhanced learning, complex problem solving and learning, knowledge management, adult learning and human performance, and artificial intelligence. She has published papers in Educational Research Review, Computers & Education, Medical Education Online, Internet and Higher Education, Information & Management, IEEE Transactions on Education, Educational Technology & Society, Innovations in Education & Teaching International, Expert Systems with Applications, Knowledge-based Systems, Journal of Knowledge Management, among others. She is the Editor-in-Chief of Knowledge Management and E-Learning and Associate Editor of Information Management. She also serves on the editorial board of several international journals including Educational Technology Research and Development, and Educational Technology & Society. More details can be found at <http://web3.edu.hku.hk/magwang/>.

1. Introduction

Cities are growing and increasingly suffering from rapid urbanization quickly taking pace with approximately 60% of the world population residing in urban and sub-urban regions, and demographic change (United Nations, 2014; MarketsandMarkets, 2014). In addition, governments progressively experience pressure toward a need for a sustainable economy, which results in a need for a qualified and retaining competitive workforce. Governments and businesses start thinking about technology as critical enabler to solve the rising urbanization issues and improve the cities' environments according to a set of priorities. Digital technologies are expected to provide better public services for citizens, allow for the effective use of resources and the protection of the environment as well as reduce the digital exclusion. Wireless and network technologies, the Internet of Things, the Internet of Everything (Mitchell, Villa, Stewart-Weeks, & Lange, 2013), cloud computing, decision support systems and artificial intelligence are only few of the solutions toward products and services that are foreseen to make the cities "smarter", and comfortable in the context of transport, climate, food, energy, health, education, etc.

A Smart City concept refers to acknowledged initiatives, such as e-Home, e-Office, e-Government, e-Health, e-Education and e-Traffic, which nowadays create a common framework for the city's performance. It is based on self-monitoring and self-response by pooling server and network infrastructures, and respective clients together to ensure the effective interconnection of the urban substructures, and implying intelligent adaptation to the citizens' needs. Viewed in this way, smart environments concentrate on

automatic computing, self-awareness, self-configuration, self-protection, and self-optimization.

In line with the above, the Smart City concept reflects business and societal issues, as well as expectations. The potential for Smart Cities adapted to the new global economy and the citizen-enabling use of digital technologies is considerable and there are essential chances. But to take advantage of them, we must make sure that people are recognized as a driver for innovation generating a sustainable regional as well as universal competitive advantage for the enterprises, and that businesses and academia are willing and ready to modernize their approach to the citizens' inclusion and immersion in education and services in the fast changing conditions of the global market (Klett & Wang, 2013). In connection with this requirement, it is not surprising that some researchers identify the level of human capital that the city's inhabitants possess as a smartness rank criterion for cities (Langenfeld, 2015). Moreover, we have to make sure that education for all ages and all levels, knowledge and skills development, and employability are a priority in a Smart City development perspective, whereas technologies and governments can help galvanize the connection between learner and teacher, educational institution and learning (Klett, 2013).

Barcelona and Chicago, Malta and Dubai, Singapore and Amsterdam, Sejong, Soul, Bilbao, Suzhou, Kazan, Alexandria, Cape Town, New York... This is a non-embracing list of continuously emerging Smart City projects around the globe. Various definitions that evolved from Digital City through Wireless City to Smart City and recently Smart City of the Future make us aware that technology and infrastructures are the leading aspect of the Smart City concept. However, there is no single approach to a Smart City, and no one-size-fits-all approach to a Smart City. Against this background, researchers, leaders, experts and policy makers come together and start detecting and analyzing the multifaceted aspects of the envisaged Smart City, define the measures, set up a strategy and build constructive plans to shape their own Smart City vision into a sustainable solution based on identified specific needs and proper partnerships.

According to Elfrink and Kirkland (2012), Barcelona represents one of the largest European transformational projects with 45,000 jobs created and 1,500 companies attracted, building an own focus on revitalization of old cities. The authors position the Amsterdam Smart City with its more than 100 Smart Work Centers established to offer high-end working facilities toward reducing travel and efficient and sustainable ways of working, as a showcase of the future of work and virtualization. In terms of economic regeneration, sustainability and demographic support, the Stockholm Smart City concentrates on solutions toward e-services, public safety, active citizen involvement in public policy and green environment, being the first city in the world to roll out 4G, the new standard for mobile networks as well as the city just been ranked as one of the world's top Smart Cities (Nylander, 2014). The Madrid Smart City focuses on improving the management of public services, such as street maintenance, lighting, green spaces, cleaning and waste management (Mici, 2014), while the Göteborg Smart City vision is bound around urban future, transport solutions, green chemistry, bio based products and life science, achieving also a sustainable level of CO₂ emissions per capita by 2050 (SMART CITIES, 2014). The Yokohama Smart City is another example where a robust energy monitoring management system has been successfully implemented to move toward a low-carbon city able to track, monitor and manage energy consumption to save energy (Japan Smart City Portal, 2014). The Indian government even plans to develop 100 Smart Cities by 2022 with an economic value of the Digital India initiative estimated to be \$ 600 billion over the next 10 years (The Economic Times, 2014).

Further Smart Cities identified their vision in deeper addressing the strategic human-centered approach. For example, Bilbao became a competitive Smart City toward the implementation of knowledge management and innovation approaches reflecting information society indicators in the city development, while Santander developed a strategy toward innovation and collaboration and created a world city-scale experimental research facility to support typical Smart City applications and services around the Internet of Things, among others integration of 12 000 sensors in the city for different purposes. Special initiatives to encourage citizen participation have been implemented, e.g. Fab Lab Barcelona that pays special attention to crowd funded projects bringing Smart City technology closer to citizens (Achaerandio, Bigliani, Curto, & Gallotti, 2012). Moreover, the Kazan Smart City is going to invest a total of \$10 billion by 2020, setting a sustainable joint infrastructure for an education complex, a business complex and a high-tech park (Aris, 2013). The Smart City Kalkara - Global College Malta is expecting up to 20,000 international students over the next years setting up business through global partnerships and binding expertise and resources from business clusters in the Dubai Internet City and Dubai Media City (Timesofmalta, 2013). Even further, the KTH Royal Institute of Technology, Sweden, introduced a new degree, M.Sc. Energy for Smart Cities, sustaining the balance between environmental and socio-economic aspects, stimulating entrepreneurial spirit, and collaborating with outstanding partner universities in the energy field (Studyportals, 2015). In proportion to this Smart City curriculum development, the Smart City Facility Alexandria established a research focus on traffic transportation systems by applying multi-agent, machine learning, and dynamic programming as well as on high performance cloud computing infrastructure, and prepares a research focus on energy environment and health care for the future (Smart City, 2013). Many US Smart City initiatives address the challenge of developing a highly educated workforce and creating more jobs. For example, enabled by an IBM Smarter Cities Challenge grant the City of Chicago integrated career and technical education building a pipeline from high school to college to employment, creating the Roadmap for Career and Technical Education opening grades nine through 14 schools, and implementing this innovative model at the new established Pathways in Technology Early College High School (P-TECH) model school in a Public-Private Partnership collaboration (Schroeder, 2012).

Evidently, the Smart City development keeps enjoying a continuing success that seems unstoppable around the globe despite the difficulty of the task to identify the needs, the strategic directions, the implementation policies, and the long-term measures of success, despite the fact that we omit a standardized methodology for assessing the impact of Smart Cities and their underpinning technology solutions (Klett, 2013), and that according to a survey, less than half (39 %) of people interviewed knew or had heard of the term Smart City, with an extreme lack of awareness of Smart Cities with less-educated and lower income residents (Gamble, 2014), but also overlooking some disillusioning views on the Smart City as a multiplexed data-driven city of enthusiasts who are going for the urban electrification of the 21st century (Siegele, 2013). The problem is not new. However, human desires have ever been a key source of innovation and competitive improvement. Exploiting our role to build a safe and friendly place for our and next generations, we address with this special issue our visions to create a Smart World for all the people around the world. Accordingly, we provide a variety of examples for specific Smart City actions, which draw a line between the local origin and the international significance, and help boost the value of technology to the cities' environment in a systematic process that addresses the key challenge of Smart Cities, namely exploiting resources and improving inadequate infrastructures by covering

societal needs, fostering education, and leading to a desired employment and high employability (Klett, 2013).

2. Preview of papers

This special issue of the *KM&EL International Journal* is dedicated to revealing non-traditional approaches, and advanced methodical and technological solutions as well as forward looking curriculum design lines toward a Smart City development in terms of a wide-range of education and human performance aspects including new opportunities for individual learning and instruction, technology-enhanced learning, fast changing curriculum design, next generation assessment, tailored knowledge and skills development, and profound competence management in a highly interconnected networked environment constituted around various stakeholders.

This issue provides insights on the current research and practices in Higher Education around the globe, mirroring experience from Canada, Italy, Pakistan, South Africa, Russia, India, Japan, Tanzania and the US, and each addressing unique aspects of the multi-dimensional Smart City concept, such as urbanization, city disaster management, health management, social connectivity, assessment and competence management as well as management of mobile and energy resources. The binding element for the research and practices presented is the mutual aim of improving human as well as learning, work and life performance in a Smart City accomplished by means of technology as well as human capital. Moreover, this special issue goes beyond only applying the latest technological advances, it presents solutions toward a Smart City of the Future, whereas the identified regional needs serve as a best practice example for Higher Education processes to encourage particular implementations on a global basis.

The first paper presented in this special issue, is especially devoted to the key aspect of a Smart City, namely the twofold being of people as citizens and human resources and their interactions in organizational processes in terms of competence development and knowledge exchange. Salerno, Nunziante, and Santoro make a fundamental contribution toward the management and advancement of human capital in a Smart City. By applying ontological modeling of domain competences and following a learner and didactic orientation for the support of organizational processes, such as staff recruitment, targeted training, performance assessment, employee reward systems, skills inventory management, competence matchmaking, and know-how protection, the authors present the original MOMA integrated environment, which functional modules suit the organization as well as the individual, facilitating career path developments in a particular company, professional growth according to existing skills and acquisition of new skills thanks to tailored training programs. The authors identify the added value and the distinctive features of competence and skills development in a Smart City, which refer to the opportunity to exploit the quantity and quality of the knowledge resources, and look at the Smart City of the Future as the semantic-enabled evolution of the present Smart Cities. The research and development reflected in this paper serves as an incredible source for innovative competence management in Smart City organizations, and for system integrators eager to provide a reliable framework that enables the creative research, creation, combination, and delivery of high quality Smart City resources to precisely develop the Smart Citizens' competences through informal learning applying effective semantic-based tools for information discovery and knowledge sharing.

Dedicated to the context of competence development but in the same time referring as well to human performance, the second paper considers the Smart City

initiatives as a symbiosis of technological and educational development. Focusing on the literacy of the Smart City human resources as a significant requirement, Majumder and Saha spot on learning technology and concepts like active learning where the learners can strongly participate in the process, as a non-conventional but sustainable solution toward meeting the Smart City education demands. Against this background, the authors illustrate the important role of Multiple choice questions (MCQs) in educational assessment and active learning toward enhancing the conceptual understanding of the students. They introduce a novel parse-tree matching based algorithm for potential MCQ sentence selection generation based on computation of parse tree similarity of a target sentence with a set of reference sentences and including a set of pre-processing and post-processing steps. The validation of the approach is demonstrated in the sports domain where available MCQs are collected to create a reference set and then the system developed is applied on Wikipedia pages and news articles to identify candidate MCQ sentences. The findings of the experimental results are fundamental for the demonstration of the efficiency and precision of the proposed approach, especially the ability of the automated system to leverage the active learning and assessment process. The automated MCQ generation system can benefit faculties as well as human resource managers by opening up the opportunity to exploit MCQ sentences. This new research direction includes future work on an automated approach for the rules definition, the keyword selection as well as the distractors generation, and is expected to completely emphasize the development of the next generation educational technology. Accordingly, the automated MCQ generation system effectively addresses the increased demand for knowledgeable graduates and skilled workforce in the Knowledge Society, and the Smart Cities of the Future.

Following the crucial demand of Smart Cities to improve the interaction between cities and citizens, the next four papers deal with this challenging interrelationship, and its projection on Higher Education processes, each one adding a new focus on the education and knowledge development in a Smart City from a different geographical perspective.

Sankar and Cumbie present a remarkable concept for the development of smarter cities focusing on the co-creation of value in a participatory action research project in the US. They build a next generation learning model in which university students act as co-creators of community infrastructure asset information through an integrated network of community stakeholders. In addition, this model is related to one more characteristic of the Smart City concept, namely city management in terms of solving the issues of population growth, and coastal disasters like hurricanes and storms. Community-wide disasters affect the entire community. By taking into account the interdependent public and private sectors in a multi-organizational and multi-stakeholder defined community from an overall geographical perspective, the research project investigates the concept of co-creation of information technology value as a potentially valuable mechanism to cover a distributed network of stakeholders. Against this background, the authors explore particularly the use of geospatial information systems, within a disaster-experienced community to effectively co-create value during disaster response and recovery efforts. The project results constitute the basis for the next generation learning design model where students are co-creators of value to cities. The research line and the results presented in this paper provide critical details to all researchers and practitioners dealing with Management Information systems as well as city and disaster management models. They build a solid reference for government and policy makers, educational leadership, and strategy experts developing tomorrow's smarter cities by allowing for counteracting the economic consequences of the demographic change as well as disasters through smart

relationships and citizens' as well as students' engagement. The authors draw attention to the vital need for forming and continuously maintaining the culture of interaction between cities and citizens to achieve change in the city as well as human development.

Kazanzev and Zakhlebin regard urban performance as the unity of hard infrastructure (physical capital), and the availability and quality of knowledge communication and social infrastructure (intellectual capital and social capital). In following this line, the authors reflect on the advancement of human capital as one of the challenges of the Smart City concept that calls for making people culturally sensitive, and mobile, on the one hand, and for improving social characteristics, on the other hand. Kazanzev and Zakhlebin consider the requirement for improving the urban performance especially valid for industrial cities that are facing economic instability and follow a strong demand for revitalizing their public spaces and economic areas. This paper depicts the unique research model and the recent results of a long-term project in Russia, which is expected to finish in 2016, and explores the original hypothesis that a network of *internationalized* universities serves as a revitalization measure for a city, facilitating the urban development in its surrounding areas, and reducing political and social risks within a society. The authors thoroughly investigate the currently experienced gaps in Russian Higher Education internationalization for their origin, size, and nature, by providing essential information on the interdependency between urban and Higher Education performance, and its inhibiting factors, such as social divide, social collaboration, venture funds, legal issues, etc. Moreover, the research reflected in this paper illustrates how the Smart City urban eco-system demands for innovative education and citizens' involvement in urban processes, in order to avoid social gaps. Serves as an essential source for innovative change management in knowledge based organizations and governments. The findings of the study are fundamental for a broad audience of local, national and multi-national educational experts and city leaders, local communities, and policy makers involved in urban eco-system transformation at international campuses, and in fostering the socio-economic development in Smart Cities.

Takata, Hayashi, Tamatsu, and Yamagishi also address the unity of regional revitalization and Higher Education in terms of Smart City urban development providing incredible insights on valuable practice from Japan against "Shutter Street" issues caused by rapid urbanization. This paper shows the research and results from the Kanazawa Institute of Technology (KIT) Digital Signage Project, which aims to help stimulating the regional shopping district around the KIT. By combining project-based learning and on-the-job-training-like initiative the authors set up a model to investigate the opportunities for impeding the decline of shopping districts – a common problem of many Japanese cities as a result of the "Doughnut Phenomenon," wherein the population decreases in the city center while it increases in the surrounding regions, by embracing an educational direction. Looking into information and communication technologies, they can effectively supply the interrelationship between citizens, and their involvement in the urban development. Correspondingly, the KIT Digital Signage Project pioneers a solution not only to revitalizing the regional shopping areas but it also aims at improving the students' digital skills. The reinterpreted digital signage serves as a medium to promote the mutual guidance of customers between the regional stores. The cooperation obtained from the stores during the project, and the verified gain in digital movie production experience of the students, confirm the favorable direction of the revitalization strategy. Following the successful test run, the authors intend to re-engineer the project toward the management of more students and stores, to extend the approach to a general, multipurpose digital signage platform to be adapted to campuses, for example as a simultaneous lecture movie distributor to multiple classrooms, but to use the system toward increasing the *student satisfaction* as a key indicator for the quality of life and

performance in a urban eco-system, too. A major advantage of the system is its extensibility and adaptability. The authors envisage the implementation of the developed system into Smart City infrastructures, especially in the presence of sophisticated high-speed wireless WAN/LAN environments, to enhance the smart communications between city residents as a new generation information medium, even unifying TV broadcasting concepts and novel regional community media in support of the regional revitalization. The results presented in this paper provide indispensable details to all researchers, practitioners, and educational leaders, dealing with demographic change as well as advanced educational models and curricula toward strengthening the interrelationship between education and cities and focusing on appropriate strategies to shape adequate human capital that fits the Smart Cities demands.

Qureshi, Raza, and Whitty provide an original contribution to mastering the interrelationship between people and organizations in the context of Higher Education – with a specific focus on the dynamically changing social media scene. The authors suitably tackle the manifoldness of social communication in a modern Higher Education setting and argue that social media, particularly Facebook, can be applied as a tool for e-Learning, and become a driver for growing education and thus, support the provision of quality informal education to all citizens in a Smart City concept. By looking at a Smart City as an answer to different challenges, such as socio-economic development and quality of life, Qureshi, Raza, and Whitty concentrate on the rising demand for people to be interconnected and cross-related, and consequently, on the major education transformations in urban eco-systems. Due to the widespread of the Internet, and its influential impact on our life, the authors assume better chances for students to interact and learn from teaching staff, faculty members, student teams as well as social communities. Taking advantage of the remarkable popularity and acceptance of Facebook for social interaction, the authors direct their research beyond traditional methods of communication in Higher Education institutions in Pakistan and address the Facebook potential to improve the students' academic performance through facilitating the communication between students and faculty members, and support the development of social capital, and user generated content. This research is highly relevant as Pakistan is facing challenges regarding the implementation of e-Learning while simultaneously social media is widely adopted regardless of those challenges. The study conducted according to measures, such as student's perception, academic contribution, student faculty relationship as well as concerns for distraction and privacy, clearly indicates that students desire to widen social communication with the faculty utilizing the advantage of an informal channel, such as Facebook, by also using this channel to support their studies as an e-Learning tool, e.g. uploading quizzes, lectures and assignments. The study results demonstrate that Facebook can be relevant for educational purposes in Pakistan. Moreover, it is applicable to many other developing countries having similar urban experience. The authors make a strong contribution to enhancing the link between students and faculty in a urban setting, followed by an enrichment of the cooperation, and interaction between people as a value creator in learning communities and organizations. In view of this, information and communication technologies and social media are considered an enabler of the Smart City eco system. Alongside with undoubtedly illustrating the advantages of a urban connectivity toward a Smart City, the authors call for a proper cultural awareness in terms of data and information security, and regulatory frameworks.

Devoted to the context of Higher Education but simultaneously referring to urban resources consumption and management, the seventh paper initially spots the use of mobile technology to sustainably support education and skills development in developing

countries, based on results from Tanzania. Seeking for an efficient way to improve the quality of experience and the participation of learners in the education process, as well as facilitate the mobility and portability in learning activities, Mahenge and Mwangoka found their research around the fact that the majority of the students own more than one mobile device, which can be applied to smoothen the access to learning content. Against this background, the authors present a beneficial conceptual model that serves a Cost-effective Mobile Based Learning Content Delivery system for resource and network constrained environments. They address contents synchronization and caching as an alternative approach for content delivery and accessibility reducing in that manner the dependence on the Internet connection. Thus, the system can serve the cost-effective wide-spread of education in many cities around the world, which are approaching the Smart City concept in their own way, even when the available technology infrastructure appears demanding. The major advantage of the system consists in its potential to reduce the cost of the bandwidth usage, and in the same time the server workload as well as the Internet usage overhead by synchronizing learning contents from a remote server to a local database in the user's device for offline use, in contrast to the majority of available web-based Learning Management Systems that highly depend on the Internet bandwidth for high performance and reliability. Moreover, despite cost-effectiveness, offline accessibility; mobility and portability the system fortifies the learning experience with respect to increasing learner motivation, enabling collaboration through the integration of social networking tools, as well as the built-in timeless ever-presence capacity. The results presented in this paper reveal critical details on the use and implementation of mobile technology in developing countries. They constitute a meaningful basis for all researchers, academics, service and infrastructure providers dealing with the application and improvement of human and technology infrastructures as well as technology-enabled services to achieve an all-compassing learning experience, better quality of life and learning, as well as an effective and active citizen engagement in a 'Smart City' model of a urban eco-system in developing countries.

McGibbon, Ophoff, and Van Belle also follow the vital demand for smart management of resources in an urban environment, establishing a unique path in a Smart City concept from a typical university setting toward a smart campus as a distinctive symbol for innovation and laboratory for experiments. This paper reflects research conducted in the framework of Smart Cities, especially in the action line of an interrelationship between the city and the rising demand for a green environment, tackling in the same time the high priority theme of sustainable development in a research and learning agenda. In particular, it explores the linkage between smart buildings and an intelligent community (daytime occupants), employing the University of Cape Town as a case study and serving as a best practice example for urban development in Cape Town, one of three smart cities in Africa. Moreover, it goes beyond theoretical explanation and provides practical and impactful results addressing the demand for a behavioral change toward energy consumption, and establishing energy awareness. Alongside with testing the analytical tools for measuring the energy consumption in the real-time monitored buildings and the reported saving of 10%, the pilot study explored the ways of how basic Smart City components, such as smart buildings and intelligent community, can be aligned with environmental objectives, particularly energy consumption and Greenhouse Gas emissions, using various strategies, such as segmentation of the intelligent community and provision of customized motivational strategies, feedback tactic, competitive game between faculties, etc. This research builds an important step toward the advancement of Green Information Systems, which are dedicated to the convergent consideration of technology, people, data and processes by enabling simultaneously tracking and management of environmental objectives. Its major advantage is the built-in

vision of the university that bridges the gap between theoretical basis and practical experience as an innovative place and sets up a long-term program toward sustainable urban development in a Smart City environment. Furthermore, it unmistakably shows the need to look at the interrelationship between Smart City indicators, for example here knowledge workforce and green environment, in a holistic as well as symbiotic manner, by inspiring citizens for a behavioral change with regard to the design of a sustainable future.

In view of the present Smart City discourse, the ninth paper leaves the educational grounds and demonstrates the entire complexity of Smart City eco-systems, and urban development, offering a critical view on the Smart City nature debate in terms of health care management practices and proper involvement of people in decision, management and design procedures. Saade, Vahidov, Tsoukas, and Tsoukas focus on a major disease management experience in Canada, whereas disease management is seen as a subset of the e-Health paradigm. The authors introduce a situated clinical decision support system for the clinical environment of a Smart City. This decision support system ultimately interrelates with the Smart City indicators, namely an *internet-connected web of citizens (people) and electronic sensors/devices*. Furthermore, this research refers to the recent lack of effective Smart City knowledge management systems that can facilitate the symbiosis of tacit knowledge, common practice, and information technologies, accompanying the human stages from birth to death. As one of the key responsibilities of a Smart City urban eco-system the authors consider informing citizens (people). To successfully serve its citizens, the Smart City has to provide opportunities to aggregate, summarize and synthesize data in hospitals and clinics enabling short term resources planning, helping experts make informed decisions and communicate them adequately. The solution to this challenge starts with engaging people in the development of such systems. In a deep and detailed research the authors illustrate the system development steps and the pilot implementation by involving all the stakeholders from the beginning. The results exemplify the feasibility, potential and benefits of integrating a decision support system into a clinical environment, for example time savings, improving the clinical process, and providing consistent consultation and information for the patient. Saade, Vahidov, Tsoukas, and Tsoukas make a strong contribution to closing the gap in the recent vague treatment of health care and disease management in a Smart City system, and to clarifying its interfering factors in terms of information and knowledge issues. These issues can be properly controlled via the implementation of sufficient knowledge management technologies that can supply the alignment between data collection and data exploitation during human life and city development phases. This paper provides a solid reference for health and city managers, leadership, strategy experts, government and policy makers, dealing with the gap in recent Smart City frameworks with regard to an omitted smart health care representation as well as future smart workforce requirements. The reproducible implementation of the presented system serves as a remarkable source for improving the all-embracing scope of a Smart City concept that calls for a holistic view on its components and indicators, in order to be successful and accepted by its citizens.

3. Conclusions

The Smart City appears as the all-encompassing approach of people to live in a better world, in a better place following a dream that a 'better technology'-driven process will prevail over legacy systems, and recently missing legislation and policies, and sometimes

non-available interoperability between systems as well as country-based solutions. Researchers, leaders, experts and policy makers will further explore, and shape the scope of the Smart City concept based on latest regional, economic and technology developments. We believe to facilitate with our findings, the important experiences, approaches and recommendations provided in this special issue of the KM&EL International Journal, the adaptive implementation of the Smart City concept to advance the educational landscape and the employment conditions of the tomorrow's smart workforce by improving human as well as learning, work and life performance in a Smart City setting. Considering the entire complexity of Smart City eco-systems, this improvement can only be accomplished by means of an integrative view on technology and human capital. Moreover, the proper management of and the desired connectivity between citizens and cities requires a steadfast holistic view on the building blocks and indicators of a Smart City concept that aligns regional strategy, citizens involvement and proper user-centered technology with the dual nature of the Smart Citizens as informed and active residents, on the one hand, and skillful human capital, on the other hand.

References

- Achaerandio, R., Bigliani, R., Curto, J., & Gallotti, G. (2012). *White paper: Smart cities analysis in Spain 2012 — The smart journey*. Retrieved from http://www.portalidc.com/resources/white_papers/IDC_Smart_City_Analysis_Spain_EN.pdf
- Aris, B. (2013). *Kazan - A smart city in the making*. Retrieved from <http://www.bne.eu/content/story/kazan-smart-city-making>
- Elfrink, W., & Kirkland, R. (2012). *The smart-city solution*. Retrieved from http://www.mckinsey.com/insights/public_sector/the_smart-city_solution
- Gamble, R. (2014). *Survey says: General population lacks awareness on smart cities*. Retrieved from <http://cityminded.org/survey-says-general-population-lacks-awareness-smart-cities-11670>
- Japan Smart City Portal. (2014). *Yokohama smart city project (YSCP)*. Retrieved from <http://jscp.nepc.or.jp/en/yokohama/>
- Klett, F. (2013). *Smart cities - Infrastructures and technologies for education, and human and skills development*. Plenary Talk at IEEE-Ciudad Creativa Digital Guadalajara Smart City Launch, Guadalajara Mexico.
- Klett, F., & Wang, M. (2013). Editorial: The war for talent: Technologies and solutions toward competency and skills development and talent identification. *Knowledge Management & E-Learning*, 5(1), 1–9.
- Langenfeld, J. (2015). *Smart cities: Smart cities can be measured by the amount of human capital*. Retrieved from <http://geography.about.com/od/urbaneconomicgeography/a/Smart-Cities.htm>
- MarketsandMarkets. (2014). *Smart cities market by smart home, building automation, energy management, industrial automation, smart healthcare, smart education, smart water, smart transportation, smart security, & by services - Worldwide Market Forecasts and Analysis (2014 - 2019)*. Retrieved from <http://www.marketsandmarkets.com/Market-Reports/smart-cities-market-542.html>
- Mici, B. (2014). *Madrid, Spain launches IBM smarter cities project*. Retrieved from <http://www.globalsiteplans.com/environmental-design/infrastructure/madrid-spain-launches-ibm-smarter-cities-project/>
- Mitchell, S., Villa, N., Stewart-Weeks, M., & Lange, A. (2013). *The internet of everything for cities: Connecting people, process, data, and things to improve the 'Livability' of cities and communities*. Retrieved from

- http://www.cisco.com/web/about/ac79/docs/ps/motm/IOE-Smart-City_PoV.pdf
- Nylander, J. (2014). *Stockholm among top 'smart cities' -- hailed for its integrated telecom and IT network, active citizen involvement and green environment*. The Swedish Wire. Retrieved from <http://www.swedishwire.com/business/19398--stockholm-among-top-smart-cities>
- Schroeder, K. (2012). *Building the pipeline to tomorrow's jobs: Smarter cities challenge, Chicago*. Citizen IBM Blog. Retrieved from <http://citizenibm.com/2012/02/building-the-pipeline-to-tomorrow%E2%80%99s-jobs-smarter-cities-challenge-chicago.html>
- Siegele, L. (2013, September 7). *Clever cities. The multiplexed metropolis*. *The Economist*. Retrieved from <http://www.economist.com/news/briefing/21585002-enthusiasts-think-data-services-can-change-cities-century-much-electricity>
- SMART CITIES. (2014). *Gothenburg*. Retrieved from <http://eu-smartcities.eu/place/gothenburg>
- Smart City. (2013). *Smart city facility: Smart traffic project*. Retrieved from <http://scf.ejust.edu.eg/scf/?q=node/32>
- Studyportals. (2015). *M.Sc. energy for smart cities*. Retrieved from <http://www.mastersportal.eu/studies/31504/energy-for-smart-cities.html>
- Timesofmalta. (2013). *New college to offer specialist Master's degrees at smart city*. Retrieved from <http://www.timesofmalta.com/articles/view/20130707/education/New-college-to-offer-specialist-Master-s-degrees-at-Smart-City.477025>
- The Economic Times. (2014). *Cisco unveils 'Smart City' model for a digital India*. Retrieved from http://articles.economictimes.indiatimes.com/2014-09-23/news/54239371_1_digital-india-citizen-services-smart-networks
- United Nations. (2014). *World's population increasingly urban with more than half living in urban areas*. Retrieved from <http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html>